

# Lake Huron Fish Community Questionnaire

Final Report





# **Lake Huron Fish Community Questionnaire**

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## EXECUTIVE SUMMARY

Fish stocking as a fisheries management practice commonly occurs in Lake Huron and other waters throughout Ontario. To assist in stocking decisions for Lake Huron, the Upper Great Lakes Management Unit (UGLMU) of the Ontario Ministry of Natural Resources is developing a stocking plan for all stocked fish species. While information is known about the effects of stocking on fish communities, little is known about the preferences that the public has for the Lake Huron fish community, and the outcomes of fish stocking more specifically. To this end, a social survey on fish stocking was developed and administered to three groups: Licenced Anglers, Local Residents, and a Convenience Sample of self-identified interested individuals.

The primary objectives of the survey were:

1. to determine the fish stocking preferences of Ontarians who recreate on, live near, or earn a living from Lake Huron; and
2. to assess the similarity in fish stocking preferences among different groups of people.

The key findings related to these objectives were:

- Strong support existed among all three groups for the use of stocking as a management tool for Lake Huron.
- The most preferred mixture of species among all three groups was a balance of introduced and native fish species for stocking into Lake Huron.
- Individuals from the Licenced Anglers group preferred fish stocking strategies that favour walleye (*Sander vitreus*) more than did individuals from the other groups.
- Individuals from the Convenience Sample preferred fish stocking strategies that favour Chinook salmon (*Oncorhynchus tshawytscha*) more than did individuals from the other groups.
- The health of the sport fisheries and the prey fish community size and composition were important to many individuals when considering management outcomes from stocking strategies.
- Many respondents believed that the environmental quality of Lake Huron has declined over the past ten years.

## SOMMAIRE

L'empoissonnement est une méthode de gestion des pêches communément employée au lac Huron et dans d'autres plans d'eau de l'Ontario. Pour faciliter la prise de décisions sur l'empoissonnement du lac Huron, l'Unité de gestion des ressources des Grands Lacs supérieurs du ministère des Richesses naturelles de l'Ontario a élaboré un plan de gestion de toutes les espèces de poissons stockés. Les effets de l'empoissonnement sur les populations de poissons sont peut être connus, mais on en sait peu sur les préférences du public pour les poissons peuplant le lac Huron et, plus particulièrement, sur les résultats de l'empoissonnement. C'est pourquoi un sondage sur les stocks de poissons a été créé et mené auprès de trois groupes : les pêcheurs sportifs avec permis, les résidents locaux et un échantillon de personnes intéressées s'étant identifiées comme telles.

Le sondage avait pour objectifs de :

- déterminer les préférences de populations de poissons des Ontariens qui pratiquent la pêche sportive au lac Huron, qui vivent à proximité de celui-ci ou qui gagnent leur pain en y pratiquant la pêche;
- relever les préférences semblables des différents groupes de personnes.

Les principales constatations découlant de ces objectifs sont les suivantes :

- Les trois groupes appuient fortement l'empoissonnement comme méthode de gestion des pêches au lac Huron.
- Les trois groupes préfèrent un mélange équilibré d'espèces de poissons introduites et indigènes au lac Huron.
- Les pêcheurs sportifs avec permis préfèrent davantage les stratégies d'empoissonnement favorisant le doré jaune (*Sander vitreus*) que les membres des deux autres groupes.
- Les membres du groupe de l'échantillon de commodité préfèrent davantage les stratégies d'empoissonnement favorisant le saumon quinnat (*Oncorhynchus tshawytscha*) que ceux des deux autres groupes.
- L'état des pêches sportives, ainsi que la taille et la composition des populations de poissons prédateurs, sont importants pour un grand nombre des personnes interrogées sur les résultats de gestion des stratégies d'empoissonnement.
- Bien des répondants croient que la qualité de l'environnement du lac Huron s'est détériorée ces dix dernières années.

## **ACKNOWLEDGEMENTS**

We thank David Gonder, Arunas Liskauskas, David McLeish, and David Reid from the Upper Great Lakes Management Unit of the Ontario Ministry of Natural Resources for their interest, support, and efforts to develop the social survey and this report. We especially thank David Gonder for the extensive amount of work that he conducted on this project including assistance writing the background information for Lake Huron (Section 1.1) and a review of an earlier version of the report. Special thanks also go to Eric McIntyre for his assistance in organizing a focus group in Parry Sound. Wolfgang Haider, Paulus Mau, and Brooke Pilley are thanked for reviewing survey instruments and helping to develop the web-based survey. Finally, we thank all attendees of the focus groups and individuals who responded to the social survey.

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## INTRODUCTION

The Ontario Ministry of Natural Resources (OMNR) is currently initiating the development of a fish stocking plan for Lake Huron. While OMNR will consider many factors when developing the plan, the preferences and views of Ontarians towards fish stocking are important considerations.

It is expected that the stocking plan will consider both native and non-native species and will prescribe stocking activities for the future. The stocking of non-native species as specified by the plan will also be screened through a required review under the the Class Environmental Assessment for MNR Resource Stewardship and Facility Development (RSFD) Projects (OMNR 2003).

## BACKGROUND

The Lake Huron ecosystem has changed substantially over the past century. Many native species have declined in number, or have been lost, for a variety of reasons including over-harvesting and invasions of exotic species (Dobiesz et al. 2005). Notably, lake trout (*Salvelinus namaycush*) populations in Lake Huron were nearly extirpated. Lake trout served as the dominant predator in Lake Huron historically and without their presence, populations of exotic prey species such as alewife (*Alosa pseudoharengus*) and rainbow smelt (*Osmerus mordax*) increased to nuisance proportions.

The increase in alewife and rainbow smelt numbers in the absence of any major predators led to the often referenced die-offs on beaches along Great Lakes shorelines (Whelan, & Johnson 2004). Fisheries managers searched for a means to control these exotic prey and found a potential solution in species such as Coho (*Oncorhynchus kisutch*) and Chinook salmon (*Oncorhynchus tshawytscha*). The first major stocking of salmon in Lake Huron occurred in the 1960s at a time when sea lamprey (*Petromyzon marinus*) control was in its infancy and sea lamprey numbers were still an impediment to rehabilitation of slow growing species such as lake trout. Pacific salmon mature at younger ages and have higher consumption rates than do lake trout and consequently, were better able than lake trout to control alewives

(Dobiesz 2003). Fisheries managers also hoped that if the stocking program was successful, the newly established salmon populations in Lake Huron would rejuvenate the recreational fishery that had essentially collapsed along with lake trout and other native species (Tody and Tanner, 1966).

At the same time as stocking and sea lamprey control activities were beginning, the Great Lakes Fishery Commission (GLFC) was formed to help coordinate fisheries management around the Great Lakes, sea lamprey control specifically. The activities of the GLFC were further formalized with the drafting of the Joint Strategic Plan for Great Lakes Fishery Management (the Plan) in 1981 with further review in 1986 and formal revisions in 1997 (GLFC 1997). The Plan mandated signatory agencies to form Lake Committees comprised of management staff from each agency on each Great Lake, with management authority. The development of Fish Community Objectives (FCOs) was to follow the formation of the committees. The FCOs for Lake Huron were finalized in 1995 (DesJardine, Gorenflo, Payne, & Schrouder 1995) and set out strategic goals and direction for the Lake Huron fish community. In part, the FCOs for Lake Huron included: achieving a self sustaining lake trout population that can provide about 1.4 to 1.8 million kg (about 3 to 4 million pounds) of harvest annually; ensuring that lake trout is the dominant species; ensuring that Chinook salmon and rainbow trout (*Oncorhynchus mykiss*) play important roles; and re-establishing and maintaining walleye as the top predator over its traditional range.

As discussed in the FCOs, stocking plays a role both in the rehabilitation of lake trout and in the creation of fishing opportunities. Lake trout are stocked by OMNR and the United States Fish and Wildlife Service (USFWS). Additionally, the State of Michigan stocks Chinook salmon, rainbow trout and brown trout (*Salmo trutta morpha fario*) and community partners in Ontario waters stock Chinook salmon, brown trout and rainbow trout. Over the past decade on the Ontario side of Lake Huron, an average of 1.9 million lake trout, 540,000 Chinook salmon, 330,000 rainbow trout, 320,000 walleye, and 23,000 brown trout were stocked on an annual basis. This stocking included a mix of both fry and yearlings.

Although stocking plays an important role in fisheries management in Lake Huron, recent

changes in the ecosystem including prey fish declines and overall declines to system productivity, have suggested that current stocking practices may need to be reviewed (Beuce and Mohr, 2008). There has also been increasing natural reproduction of lake trout, walleye, yellow perch (*Perca flavescens*), and Chinook salmon (Beuce and Mohr, 2009). The RSFD Class EA screening also requires a review for non-native stocking in Ontario waters.

Given the current need to review stocking practices in Ontario waters, the Upper Great Lakes Management Unit (UGLMU) is in the initial stages of developing a stocking plan. The development of the stocking plan will consider a number of factors. These include:

- Stakeholder and Aboriginal perspectives on fish stocking
- Current ecosystem science
- International aspects of Great Lakes fisheries management
- Balancing predator demand with prey production

To quantify perspectives on fish stocking, a social survey was developed and implemented. This report describes this effort and how the results address the objectives for the survey that are described below.

## OBJECTIVES

The survey was designed to collect information to meet two primary objectives. The first objective was to determine the fish stocking preferences of Ontarians who recreate on, live near, or earn a living from Lake Huron. More specific research questions were developed from this first objective including:

- What level of acceptance exists among people for stocking different fish species in Lake Huron?
- What mix of fish species do people prefer for stocking into Lake Huron?
- What level of fish stocking do people prefer for Lake Huron?
- What are the desired outcomes from stocking in Lake Huron?

We suspect that anglers will prefer stocking fish species that they consider good quality sport fish. Assuming that quality is related to catch and harvest, the lower harvest of lake trout than most other stocked species by resident anglers in Lake Huron (Department of Fisheries and Oceans 2008) suggests that preferences for stocking lake trout will be lower than for rainbow trout, walleye, and Chinook salmon. It is possible, however, that increasing hesitance among fisheries scientists and others for stocking fish (e.g., White, Karr, & Nehlsen 1995) may lead some anglers and other individuals to disagree with stocking and/or to favour stocking of native (lake trout and walleye) over the non-native species (Chinook salmon, rainbow trout, and brown trout).

The second objective was to assess the similarity in fish stocking preferences among different groups of people. To assess this similarity, we targeted three groups of individuals with our survey efforts. First, we conducted a random sample of *Licensed Anglers* who reside near Lake Huron. Second, we conducted a random sample of the *Local Residents* who reside near Lake Huron. Finally, we solicited survey responses from interested individuals whom we labelled the *Convenience Sample*. These three diverse groups provide an opportunity for us to identify differences in preferences for fish stocking in Lake Huron. We suspect that the different levels of importance of Lake Huron and the fish community to the respondents will affect the preferences that these individuals have for fish stocking.

The survey also served to address three secondary objectives that are phrased as research questions:

- How do people make use of Lake Huron for recreation and fishing pursuits?
- What perceptions exist about the changing environmental quality of Lake Huron?
- What are the demographic characteristics of individuals from the three groups?

We believe that most survey respondents will use Lake Huron for recreational fisheries and other pursuits. Given the amount of communications about invasive species and recent media coverage about the quantity of water in Lake Huron, we suspect that most respondents will believe that Lake Huron is experiencing a degraded environmental quality.

## METHODS

We used a social survey to collect information on preferences, experiences, attitudes, and perceptions about the management of Lake Huron and fish stocking in Lake Huron. The survey was administered to three different groups to ensure that we could hear from potentially different voices. First, a random sample of 750 names was drawn from the Ontario Ministry of Natural Resources' Outdoors Card Database who purchased a fishing license in 2006 and who lived in close proximity to Lake Huron<sup>1</sup>. We labelled this group as *Licensed Anglers*. Second, a random sample of 750 people living in close proximity to Lake Huron (*Local Residents*) was drawn from a purchased phone list. This group inevitably included some licensed anglers, but provided a general perspective of individuals living near Lake Huron. Third, we sought to hear voices from individuals who were especially motivated and interested to share their views. This *Convenience Sample* was expected to provide perspectives from individuals who typically engage in natural resource management activities (e.g., advisory committees and information sessions as well as First Nations communities around Lake Huron).

Both mail and internet questionnaires were developed for the two random samples. Unique access codes were included in the initial mail contact with potential respondents, allowing them to access the web-based survey while avoiding duplicate responses from the same individual. The use of the codes also reduced mailing costs by avoiding additional contact with respondents who had already completed the web-based survey.

Individuals from the random samples were contacted up to four times by mail following the tailored design method (Dillman 2000). First, individuals received a letter that explained the project, provided notification that a survey package would be arriving, and provided a unique access code for the web-based survey. The second contact was sent about one week later and included a letter, survey instrument, and self-addressed stamped return envelope. Following another week, non-respondents were sent a postcard reminder. Finally, two weeks later all non-respondents were sent a second survey package with a covering letter, return envelope and questionnaire. No checks for non-response bias were conducted.

For the *Convenience Sample*, a separate web-based survey was hosted that did not require an access code. During initial contacts, respondents in this survey group were given the website address to an Environmental Registry posting (Environmental Bill of Rights Registry Number 010-0986) that provided background material on fisheries management on Lake Huron, and a link to the web-based version of the survey. It was expected that people contacted by UGLMU staff as part of the *Convenience Sample* group would disseminate the information and survey website widely for completion amongst people they knew.

The response rates to the survey were good. The rate was higher for the *Licensed Angler* group (68% based on 491 of 750 surveys returned with 32 undeliverable) than the *Local Residents* (53% based on 312 of 750 surveys returned with 160 undeliverable). Another 328 responses were received from the *Convenience Sample*. The web-based survey option was used by 80 of the 491 (16%) respondents from the *Licensed Angler* group, 40 of 312 (13%) respondents from the *Local Residents*, and 289 of the 328 (88%) respondents from the *Convenience Sample*.

The questionnaire (APPENDIX D) consisted of three sections and was pre-tested during focus group sessions in Owen Sound and Parry Sound. In the first section, individuals were asked to share perceptions about the importance of Lake Huron, familiarity with different parts of the lake, and ways that they make use of the lake. Respondents were also asked about their awareness of fish stocking; preferences for stocking different fish species, numbers, and mixes of species; recreational fishing activities; and perceptions of the changing environmental quality of the lake.

The second section involved a stated preference choice model (Louviere & Woodworth 1983) that presented respondents with competing management outcomes. Respondents were asked to choose between two competing hypothetical profiles or choose the current conditions. The profiles were described with attributes including the risk of fish stock collapse, the prey fish community, the abundance of Chinook salmon, lake trout, walleye, brown trout, and rainbow trout, and the average size of fish. Three levels were used to describe each attribute as shown in Table 1. An experimental design plan was used to estimate the importance of each attribute without influence

<sup>1</sup>Close proximity was defined as all residents living lake-wards of highways 26, 21, 400, 69 and 17 from Sarnia to Sault Ste. Marie.



**Table 1.** Attributes and levels for the stated preference choice model.

Attribute	Level 1	Level 2	Level 3
Risk of fish stock collapse	Slightly increased	Same as today	Slightly decreased
Preyfish community	Mostly introduced	Same as today	Mostly native
Lake Trout abundance	50% less	Same as today	50% more
Walleye abundance	50% less	Same as today	50% more
Chinook Salmon abundance	50% less	Same as today	50% more
Rainbow trout abundance	50% less	Same as today	50% more
Brown trout abundance	50% less	Same as today	50% more
Average fish size	50% smaller	Same as today	50% larger

from the other attributes. The fractional factorial design plan required 27 separate choice sets that each contained two hypothetical profiles along with the current conditions. A 28<sup>th</sup> set was constructed and four versions of the survey were developed; each with seven choice sets. Respondents were asked to select their most preferred outcome from the three outcomes presented in each set (two competing hypothetical outcomes and the current conditions). We also asked respondents to rate their level of confidence for each choice.

The analysis of the choice experiment portion of the survey allowed us to assess the relative preferences for different attributes and attribute levels. For example, the analyses permitted us to assess differences in preferences for changes to Chinook salmon abundance. We also used the analyses to estimate trade offs that individuals would make between desirable and undesirable attributes (e.g., we could assess whether a 50% increase in fish size could offset a 50% decrease in Chinook salmon abundance). We used these preferences to build a decision-support system that predicts the likely support that individuals will have for competing outcomes.

The analyses of the choice data were conducted with a conditional logit model. We statistically compared whether preferences for attributes and attribute levels differed depending on an individual's group (i.e., *Licensed Angler*, *Local Residents*, and *Convenience Sample*).

The third section asked individuals some basic demographic and environmental values questions. Information about sex, age, and education were included to assess differences among our three samples and census data. A subset of the New Environmental Paradigm scale (Dunlap & Van Liere 1978) was included to assess environmental

values.

With the exception of the stated preference choice model, the analyses are reported in the Results section with response percentages and means. We conclude that significant differences in responses existed among the groups when the probability that the responses were the same is very small (i.e.,  $p < 0.05$ ). For some statistical analyses, we also provided conclusions whether differences existed between two groups of responses. These secondary analyses accounted for the fact that conducting multiple pairwise comparisons can lead to over reporting of statistical differences. Algebraic expressions were used to communicate significant differences in responses between groups. For example,  $A > C > R$  means that the responses from the *Licensed Anglers* (A) group were highest followed by the *Convenience Sample* (C) and *Local Residents* (R)).

For all data without an order among the response options (e.g., preferred fish species), statistical analyses were based on the similarity of the responses from each group (i.e., a Chi-square analysis). For ranked data, the statistical analyses used the ranking information (e.g., familiarity with a basin) when assessing whether differences in responses existed among the groups (i.e., a Kruskal-Wallis H-test was employed). When we concluded that significant differences in responses among the groups existed, we identified differences between pairs of groups (e.g., between *Convenience Sample* and *Local Residents* groups) with further statistical tests (i.e., Bonferroni corrected probabilities with a Mann Whitney U-test). For scored data that had more values around the mean than the extremes, statistical analysis focused on differences in mean values among the groups (i.e., a one-way ANOVA was conducted). Again, when significant differences

**Table 2.** Number of respondents who were "very familiar" with each of the basins and tributaries of Lake Huron.

Basin	Number of Respondents (n)	Basin tributaries	Number of Respondents (n)
Main Basin	295	Main Basin – rivers	221
Georgian Bay	417	Georgian Bay – rivers	273
North Channel	167	North Channel – rivers	105

among the means for each group existed, further statistical tests were used to identify differences between pairs of groups (i.e., Bonferroni post hoc tests).

To address the second objective of the survey, we occasionally explored differences in responses according to a respondent's identified awareness of basins of Lake Huron (Main Basin, Georgian Bay and the North Channel and their associated tributaries). These results provided further insight into species and stocking preferences for the different basins of Lake Huron. Results are provided for the number of respondents who identified themselves as being "very familiar" with each basin (Table 2) resulting in responses for some individuals being counted for multiple basins. For this reason, no statistical analyses were conducted on these comparisons.

Finally, we recorded the comments that people provided on the surveys. These comments were coded into themes and summarized accordingly.

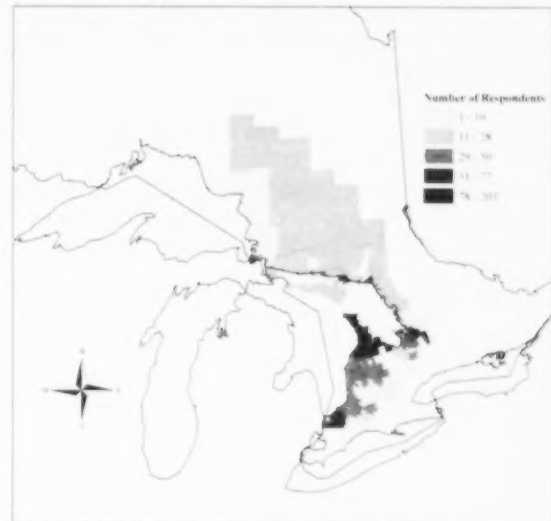
## RESULTS

The distribution of home addresses of the respondents among census divisions is shown in Figure 1. As expected, the respondents were located in the census divisions with larger populations that border Lake Huron.

The following subsections summarize the survey results by the three sampling groups. Where applicable, we also provide the results of statistical tests that assess whether the responses from the three samples were different or simply arose from chance. Most captions for the tables included the exact wording of the question.

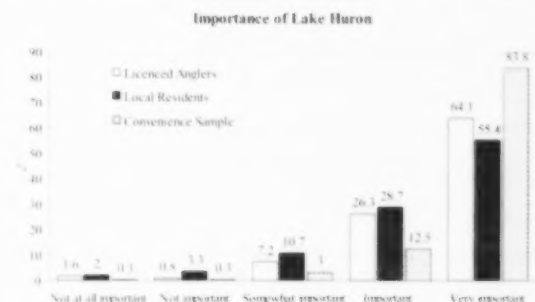
### General Knowledge and Use of Lake Huron

The first four questions of the survey asked respondents some basic questions about Lake Huron. These questions included the perceived

**Figure 1.** Origins of survey respondents by Census subdivisions (based on postal codes).

importance of Lake Huron to respondents, the familiarity of respondents with various parts of the lake, the ways they made use of Lake Huron, and how long they have used the lake.

All three groups rated Lake Huron as being of high importance with most respondents indicating that Lake Huron was very important to them (Figure 2). The statistical analyses revealed that members

**Figure 2.** How important is Lake Huron and its tributaries (rivers that flow directly into Lake Huron) to you personally? (n=487, 307, 328; Kruskal-Wallis H-test:  $p < 0.001$ ; Mann-Whitney U-Test:  $C > A > R$ ).

of the *Convenience Sample* placed the most and *Local Residents* placed the least importance on Lake Huron.

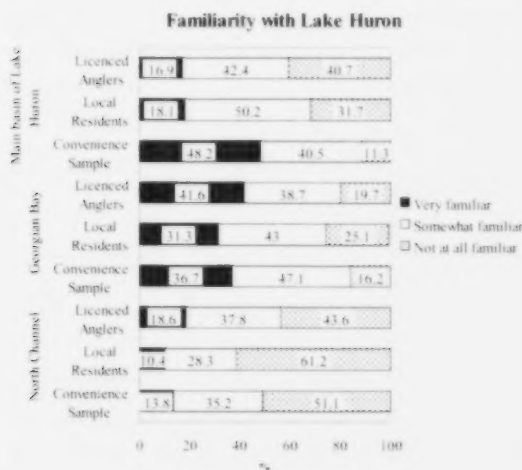
The respondents were next asked about their familiarity with the three basins of Lake Huron and the tributaries that flow into these basins. Most respondents from the groups were more familiar with Georgian Bay than the other basins (Figure 3). While respondents were typically less familiar with tributaries and rivers than with the basins, the respondents again were more familiar with the tributaries and rivers flowing into Georgian Bay than the other areas (Figure 4). The *Convenience Sample* was most familiar with the Main Basin and its rivers and the rivers of Georgian Bay, while the *Licensed Anglers* were more familiar with Georgian Bay and the North Channel and its rivers. These results have further implications when trying to understand preferences of stocking fish species (Figures 14 to 17).

Most *Licensed Anglers* and the *Local Residents* lived near the lake or its tributaries year round (Table 3) as expected given our sampling strategy. A majority, but significantly smaller percentage of respondents from the *Convenience Sample* stated that they lived near the lake year round. Over three-quarters of individuals from all three samples pursued recreational activities other than fishing (such as boating or swimming) with *Local Residents* having the lowest participation rate. Over 90% of respondents from all three samples stated that seeing the lake was important with the

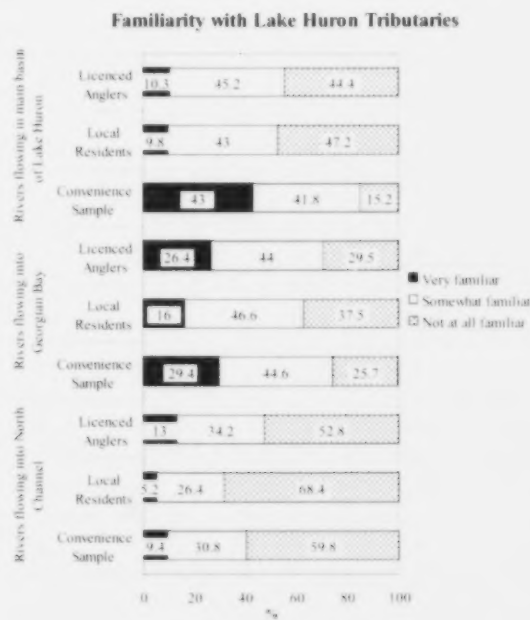
highest percentage coming from the *Convenience Sample*. A small but measurable percentage of the respondents stated that they earned a living from the lake.

Most respondents from all groups pursued recreational fishing on Lake Huron. However, *Local Residents* were significantly less likely to have pursued recreational fishing. While most respondents pursued recreational fishing, a much smaller percentage of individuals fished for food. This difference was especially notable for *Local Residents* where only about one-quarter of respondents indicated that they used Lake Huron to fish for food.

No statistically significant difference was found between the responses by the groups for the number of years that individuals used Lake Huron. In all cases, the average respondent had used Lake Huron for between 30 and 35 years (with sample sizes and standard deviations of 474/15.0, 293/18.1 and 327/15.6 for *Licensed Anglers*, *Local Residents*, and *Convenience Sample*, respectively).



**Figure 3.** How familiar are you with the following basins of the Lake Huron watershed? (n=486, 309, 328; 483, 307, 327; 484, 307, 327; U-test: C>A,R; A, C>R; A, C>R).



**Figure 4.** How familiar are you with the following basins of the Lake Huron watershed? (n= 484, 307, 327; 484, 307, 327; 485, 305, 325; U-test: C>A,R; A, C>R; A>R, C).



**Table 3.** Do you use Lake Huron or its tributaries for any of the following purposes? (%).

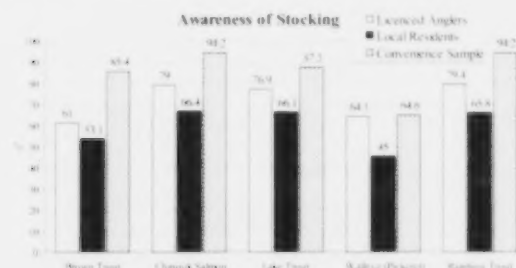
	Licensed Anglers	Local Residents	Convenience Sample	n	Chi Square
Live near the lake or its tributaries all year	81.2	80.0	68.6	478, 305, 325	p<0.001
Live near the lake or its tributaries for part of the year	4.8	5.6	17.1	477, 305, 321	p<0.001
Pursue recreational fishing	93.3	53.6	95.4	491, 308, 326	p<0.001
Pursue other recreational activities (e.g. boating, swimming, picnicking)	85.2	75.5	88.2	481, 302, 323	p<0.001
Earn a living from the lake or its tributaries (e.g. commercial fisherman, operate marina, operate tourism resort)	4.4	2.7	6.2	481, 300, 321	p=0.093
Fish for food for myself or my family	60.9	25.1	72.8	463, 291, 323	p<0.001
Enjoy seeing the lake and knowing it exists	95.6	92.7	99.1	478, 301, 321	p<0.001

### Fish and Fish Stocking in Lake Huron and its Tributaries

The next section of the questionnaire sought responses to fish stocking awareness, preferences, and policies. Further questions asked respondents to state their recreational fishing preferences and their perspectives on the health of Lake Huron and its tributaries.

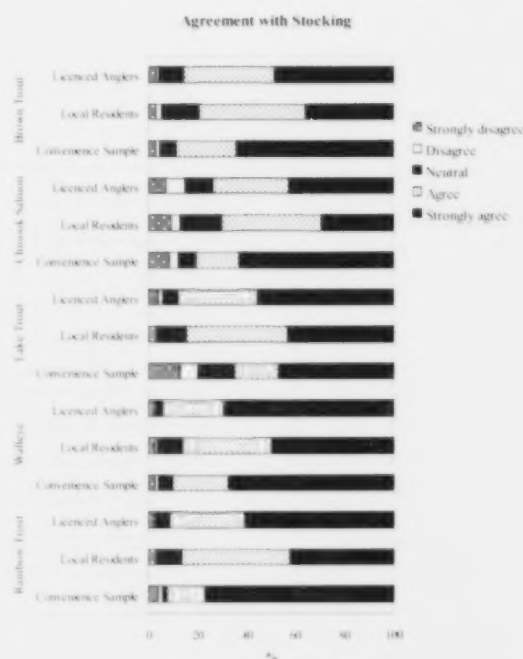
Respondents were asked to state their awareness of the stocking of five fish species (Figure 5). In general, stocking awareness was highest for the *Convenience Sample* and lowest for the *Local Residents*. The awareness of stocking was highest for Chinook salmon, lake trout, and rainbow trout. Lower awareness was observed for brown trout and walleye.

At least 70% of respondents from each population agreed or strongly agreed with stocking each

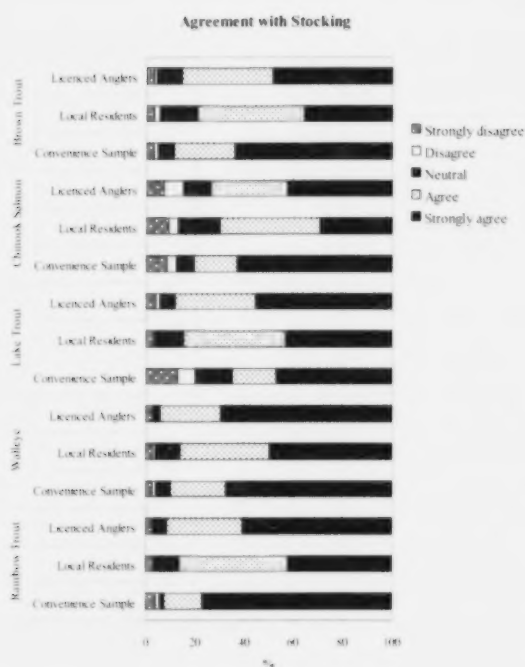


**Figure 5.** Were you aware that each of these fish species are stocked in the Lake Huron watershed prior to reading this question? (n=485, 307, 328; Chi square: p<0.001 for each species).

fish species in Lake Huron (Figure 6). Support was highest for walleye with at least 80% of respondents agreeing or strongly agreeing to stock this species. Members of the *Licensed Anglers* group were most supportive of walleye stocking.



**Figure 6.** Do you agree or disagree with the stocking of each of the following fish species in Lake Huron and its tributaries? (n=464, 266, 313; U-test: C>A>R, n=467, 269, 318; U-test: C>A>R, n=471, 274, 315; U-test: A>R, C, n=466, 269, 317; U-test: A, C>R, n=474, 207, 319; U-test: C>A>R).

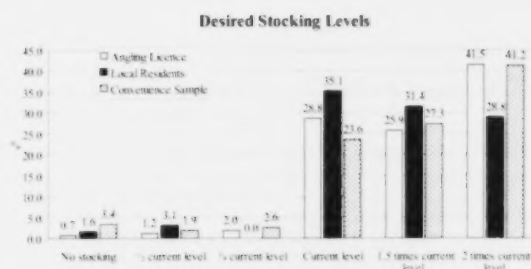


**Figure 7.** Agreement with stocking for different fish species by respondents who are familiar with the basins of Lake Huron.

Members of the *Convenience Sample* were most supportive of stocking Chinook salmon and brown trout. The members of the *Convenience Sample* were least supportive of stocking lake trout or rainbow trout.

Agreement with the stocking of the five fish species was also compared by basin. Strong agreement was found for stocking each of the five fish species by individuals familiar with each basin (Figure 7). Individuals who were familiar with the main basin had strongest agreement for stocking Chinook salmon. Agreement for lake trout was highest among individuals who were familiar with the North Channel and Georgian Bay.

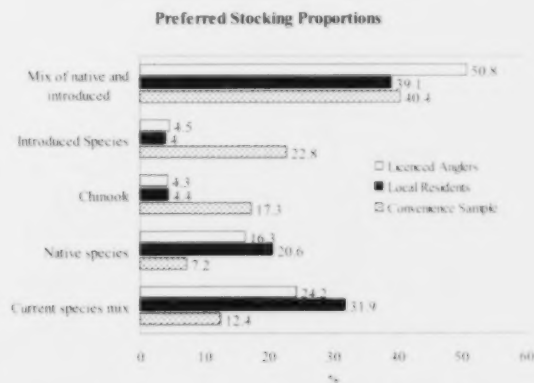
Most respondents preferred to see current or increased stocking levels (Figure 8). Among respondents that chose a different stocking level from the current level, both the *Licensed Anglers* and *Convenience Sample* were more likely to select the two times the current amount than were the *Local Residents*. The *Local Residents* were most likely to select the current stocking level.



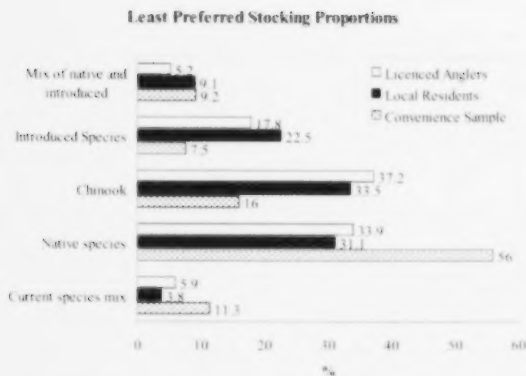
**Figure 8.** The total number of fish stocked on the Ontario side of Lake Huron currently averages 3,400,000 fish annually. Please indicate how many fish you would like to see stocked in Lake Huron and its tributaries (Chi square:  $p=0.003$ ). (Note: graph and statistical analysis do not include "unsure" and "other" responses.)

The *Local Residents* were least certain of their preferred stocking levels as about one-third (33.4%) of these respondents chose the "not sure" option compared with 12.4% for the *Licensed Anglers* and 13.2% for the *Convenience Sample* ( $n=410, 191, 267$ ). Relatively few respondents (under 2%) selected a no stocking option or any decrease to stocking levels. A small number of respondents chose the "other" option (2.5% of *Licensed Anglers*, 3.3% of *Local Residents*, and 4.6% of *Convenience Sample*).

More respondents preferred stocking a mix of native and introduced species over any other option (Figure 9). The second most preferred option for both the *Licensed Anglers* and *Local Residents* was the current species mix. The



**Figure 9.** In what proportions would you like to see fish species stocked in Lake Huron and its tributaries? – Most preferred option ( $n=443, 248, 307$ ; Chi square:  $p>0.001$ ).

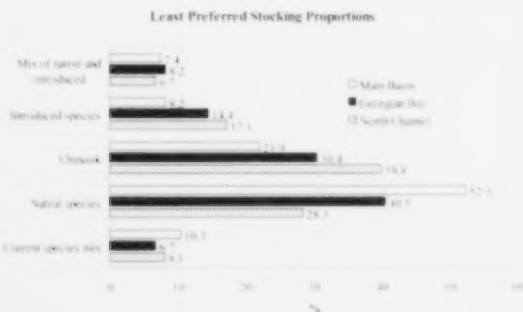


**Figure 10.** In what proportions would you like to see fish species stocked in Lake Huron and its tributaries? – Least preferred option (n=387, 209, 293; Chi square:  $p < 0.001$ ).

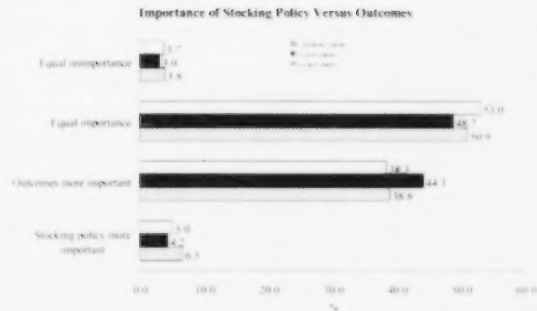
second most preferred option for the *Convenience Sample* was the introduced species option. Few respondents from the *Licensed Anglers* and *Local Residents* selected Chinook salmon and few respondents from the *Convenience Sample* selected native species as their most preferred option.

We asked respondents to rate their least preferred option for stocking fish (Figure 10). Just over one third of the *Licensed Anglers* and *Local Residents* selected Chinook salmon as their least preferred option, followed closely by native species. Most of the *Convenience Sample* selected the native species option as their least preferred option.

Familiarity with each basin of Lake Huron had little effect on the preferred mix of fish species for stocking by respondents. However, some major differences were found in responses for the least



**Figure 11.** Least preferred stocking options by familiarity of respondents with basins of the lake.

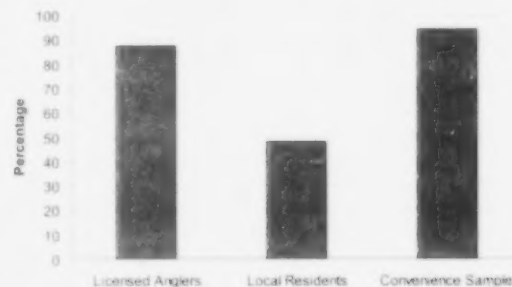


**Figure 12.** What is more important to you, the fish stocking policy or the outcomes from stocking in Lake Huron and its tributaries? (Chi square:  $p = 0.001$ ). (Note that graph and statistical analysis do not include "unsure" responses.)

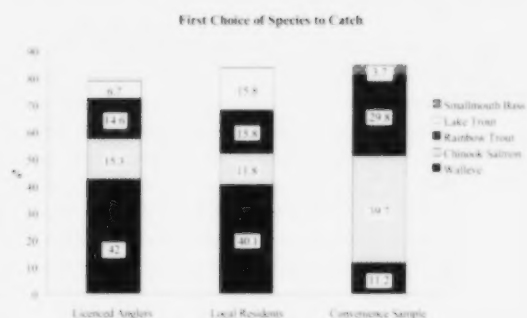
preferred options according to familiarity with each basin of the lake. Most individuals familiar with the main basin chose native species as their least preferred option (Figure 11). A large portion of individuals familiar with the North Channel chose Chinook salmon as their least preferred stocking option.

More respondents from all three groups believed that both stocking outcomes and the stocking policy were equally important (Figure 12). Of those disagreeing, a greater percentage of respondents from all three groups believed that outcomes were more important than stocking policy. Again, the *Local Residents* had the largest percentage of "unsure" responses with 14.2% compared to 5.3% for the *Licensed Anglers* and 2.9% for the *Convenience Sample* (n=446, 236, 300).

A large percentage of respondents recently fished in Lake Huron or its tributaries in 2007 (Figure 13). Individuals from the *Convenience Sample* were



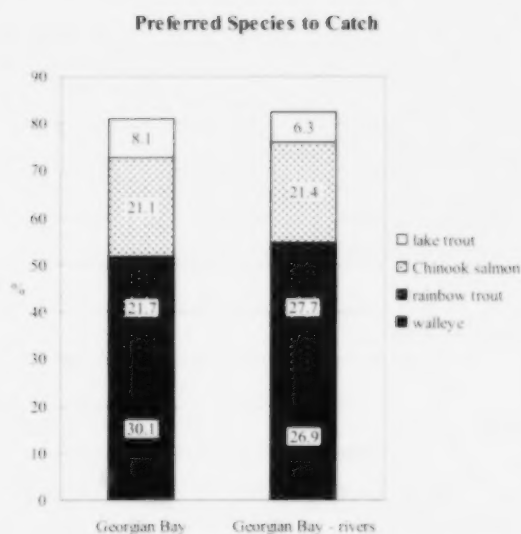
**Figure 13.** Did you fish in Lake Huron or its tributaries this past year? (% yes) (Chi square:  $p < 0.001$ )



**Figure 14.** Top four species chosen as most preferred to catch in Lake Huron or its tributaries by group type.

most likely to have fished while *Local Residents* were least likely.

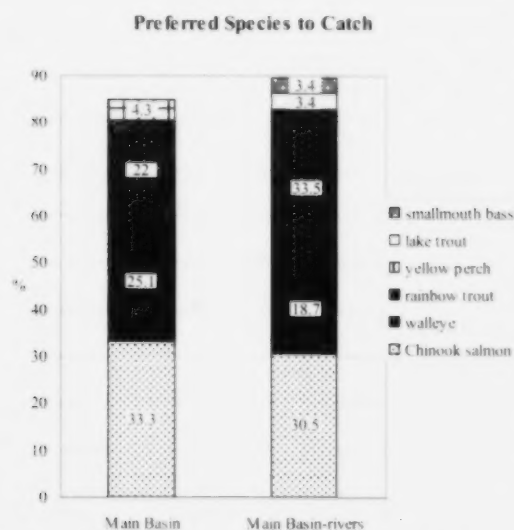
The respondents provided many different answers when asked to list the top three fish species they prefer to catch in Lake Huron or its tributaries (APPENDIX A). Overall, the most popular species were walleye, Chinook salmon, rainbow trout, and lake trout. When comparing species between groups, however, lake trout was not in the top four preferred species for the *Convenience Sample*. Instead, smallmouth bass was the fourth most preferred species. The order of preferred species differed between groups (Figure 14). Walleye was the most popular species for all but the



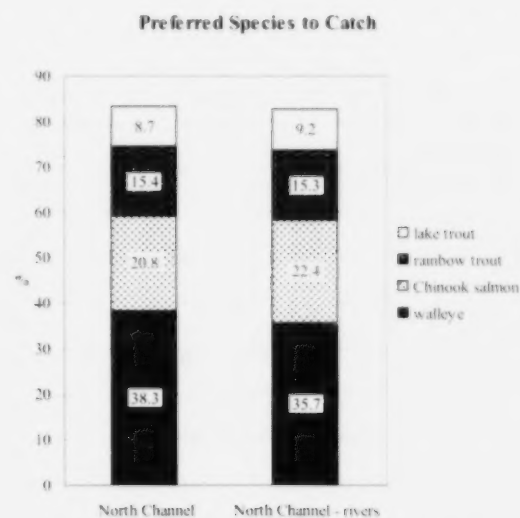
**Figure 16.** Top four species chosen as most preferred to catch by respondents familiar with Georgian Bay.

*Convenience Sample* for whom Chinook salmon and rainbow trout were ahead of walleye. A large percentage of all three groups chose rainbow trout as their second choice of fish species (APPENDIX A).

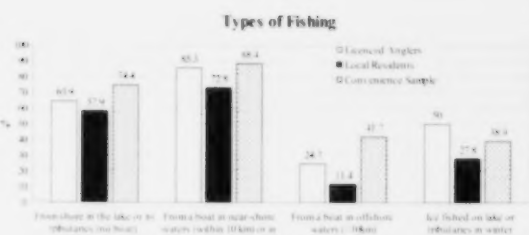
Results of the preferred fish species question were also interesting when compared by familiarity with



**Figure 15.** Top four species chosen as most preferred to catch by respondents familiar with the Main Basin.



**Figure 17.** Top four species chosen as most preferred to catch by respondents familiar with the North Channel.



**Figure 18.** Where do you fish in Lake Huron or its tributaries? (n=approximately 435, 158, 290; Chi square:  $p < 0.001$ ).

basins of the lake (Figures 15 to 17 and APPENDIX B). Consistent with previous results, Chinook salmon was the preferred species by individuals with greater familiarity of the Main basin, whereas individuals with greater familiarity of Georgian Bay or the North Channel preferred walleye.

The respondents from the three groups conducted similar styles of fishing on Lake Huron (Figure 18). Most lake fishing occurred near shore or from shore.

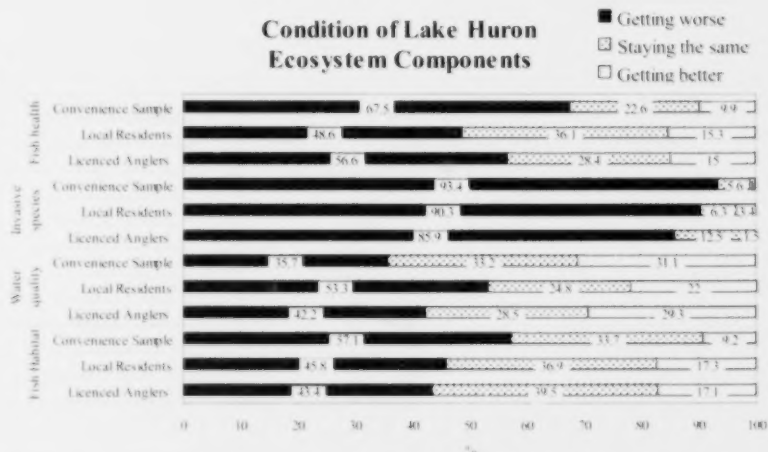
Members of the *Convenience Sample* were most likely to have pursued offshore fishing while the *Licensed Anglers* were most likely to have ice fished.

Most respondents believed that fish health, water quality, effects of invasive species and the quality of fish habitat were getting worse when compared to ten years ago (Figure 19). Respondents from all groups indicated that the deteriorating state of the lake as a result of invasive species was most noticeable. Relative to the other two groups, individuals from the *Convenience Sample* were most

likely to state that changes in ecosystem health were getting worse.

A larger percentage of the *Local Residents* chose "don't know" for changes to environmental quality when compared to the other two groups (Table 4). In addition, the largest percentage of "don't know" answers for all groups was associated with the question on fish health.

Respondents were asked five questions from the New Environmental Paradigm Scale (Dunlap & Van Liere 1978) that sought to provide a measure of people's environmental value orientation. The questions aimed to identify whether individuals leaned toward a more biocentric or anthropocentric (human-centred) worldview. Results show that individuals from the *Convenience Sample* held a slightly more anthropocentric views than did individuals from the other two groups (Table 5). This result was supported by their stronger agreement with statements including: the rights



**Figure 19.** Compared to ten years ago, how do you think Lake Huron and its tributaries are doing in the following areas? (Note: graph and statistical analysis do not include "don't know" responses).

**Table 4.** Percentage of "don't know" responses for the condition of a variety of Lake Huron ecosystem health variables.

Variable	Licenced Anglers		Local Residents		Convenience Sample	
	%	n	%	n	%	n
Fish Health	27.3	349	42.2	171	16.6	261
Water Quality	14.2	410	16.3	246	10.5	280
Invasive Species	18.4	390	28.6	210	8.3	287
Fish Habitat	21.0	379	36.4	187	12.5	274

**Table 5.** Agreement (%) with five statements related to environmental beliefs by group.

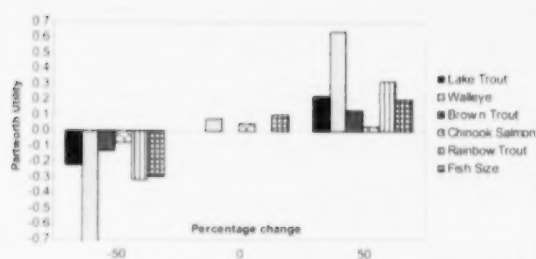
	Licensed Anglers (A)	Local Residents (R)	Convenience Sample (C)	Kruskal-Wallis H-test	Mann-Whitney U-test
Humans have the right to modify the natural environment to suit their needs	n=480, 290, 288				
Strongly disagree	24	20	18.1	p=0.001	C > A, R
Disagree	32.9	37.2	25.7		
Neutral	21	18.6	24		
Agree	17.1	21.4	25.7		
Strongly agree	5	2.8	6.6		
When humans interfere with nature it often produces disastrous consequences	n=480, 291, 291				
Strongly disagree	2.7	1.4	3.8	p=0.002	A, R > C
Disagree	12.9	9.6	14.8		
Neutral	13.3	10.3	21.6		
Agree	41.5	51.9	35.7		
Strongly agree	29.6	26.8	24.1		
Humans are severely abusing the environment	n=480, 293, 287				
Strongly disagree	2.7	2	4.2	p=0.875	NA
Disagree	8.5	6.1	7.3		
Neutral	10.4	8.2	11.1		
Agree	40.2	47.4	38.7		
Strongly agree	38.1	36.2	38.7		
Humans were meant to rule over the rest of nature	n=480, 287, 288				
Strongly disagree	34.2	31.7	34.7	p=0.841	NA
Disagree	36.9	43.9	32.6		
Neutral	12.3	10.8	14.6		
Agree	10	8.4	14.9		
Strongly agree	6.7	5.2	3.1		
Humans will eventually learn enough about how nature works to be able to control it	n=472, 288, 285				
Strongly disagree	16.7	15.3	18.2	p=0.427	NA
Disagree	36.9	35.8	33.3		
Neutral	20.6	15.3	20.7		
Agree	20.3	28.8	22.8		
Strongly agree	5.5	4.9	4.9		

of humans to modify the natural environment to suit their needs; and the fact that humans are meant to rule over the rest of nature. It was also supported through their weaker agreement with the statement that when humans interfere with nature, it often produces disastrous consequences. The most biocentric of the three sample groups was the *Local Residents*. This group was in strongest agreement with the statements that: when humans interfere with nature, it often produces disastrous consequences, and humans are severely abusing the environment.

### Preferences for a Future Lake Huron

The stated preference choice model was a major part of the survey. For this task, respondents were asked to choose their preferred management outcome from hypothetical outcomes and the status quo for Lake Huron. Each outcome was described using seven attributes that provided information about abundance and size of fish species, risk of fish stock collapse, and prey fish community.





**Figure 20.** Licenced Angler preferences for fish species abundance and fish size.

A total of 889 respondents completed all seven choice tasks and these responses were used for analysis. We used a conditional logit model that estimated how important various attributes were in leading to selection of a management outcome. A combination of this information and further data analyses was used to develop a decision support model that helped to estimate support by various groups of individuals for competing management outcomes. We limit the reporting of the results here to graphs of importance and statistical tables (APPENDIX C). The graphs express the results in part-worth utilities. Management outcomes that contain attribute levels with high partworth utilities were more likely to be selected than are management outcomes with low partworth utilities. Consequently, the partworth utilities are a measure of preference for a level of an attribute. We show the results for each of the three groups separately.

The preferences for the fish species and size by *Licensed Anglers* increased as their abundance or size moved from a reduction of 50% (bars on the left) to no change (bars in the middle) to an increase of 50% (bars on the right) (Figure 20). Walleye abundance most affected support for the management outcome. Abundance of rainbow trout and lake trout and size of fish were also important for these anglers.



**Figure 21.** Licenced Anglers preferences for status quo outcome, fish stock collapse, and prey fish community characteristics.

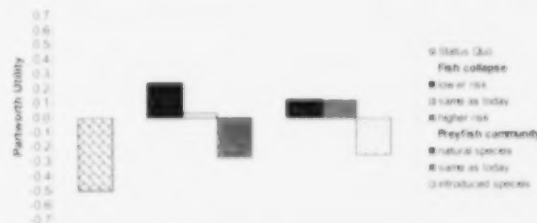


**Figure 22.** Local Residents preferences for fish species abundance and fish size.

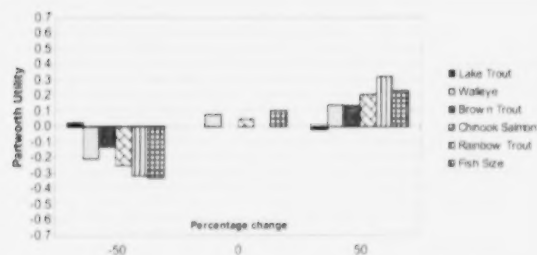
In Figure 21, the first column represents the support by *Licensed Anglers* for the status quo alternative. The negative partworth utility for the status quo alternative suggests that it was an undesirable outcome considering all else equal. The next three columns indicate preferences for different levels of potential fish stock collapse. As expected, *Licensed Anglers* were most supportive of a reduced risk of fish stock collapse. Finally, the last three columns communicate the preferences for the prey fish community. *Licensed Anglers* preferred to have a prey fish community without introduced species.

The preferences of the *Local Residents* for the abundance of various fish species and general fish size (Figure 22) showed similar results to those from the *Licensed Anglers*. Walleye was most preferred followed by rainbow trout, lake trout, and fish size. Abundance of Chinook salmon was least important to these individuals when compared to all other species.

The preferences of the *Local Residents* for the remaining attributes (Figure 23) were again similar to the results from the *Licensed Anglers*. In fact, the only major differences between these two groups were that the *Licensed Anglers* placed greater emphasis on fish species abundance and size



**Figure 23.** Local Residents preferences for status quo outcomes, fish stock collapse, and prey fish community characteristics.



**Figure 24.** Convenience Sample preferences for fish species abundance and fish size.

while the *Local Residents* were more concerned about the risk of fish stock collapse and the prey fish community.

The preferences for the fish species differed for members of the *Convenience Sample* when compared with the others (Figure 24). Rainbow trout, Chinook salmon and fish size were all relatively more important than were walleye or lake trout. Lake trout abundance was not at all important to members of the *Convenience sample*.

Compared with the other two sample groups, the results for the status quo alternative and fish stock collapse attribute were similar, while the results for the prey fish community were slightly different (Figure 25). A natural prey fish community was more important to these individuals. This result is surprising given the preference that the *Convenience Sample* had for introduced sport fish species.

Further analyses of these hypothetical choices were conducted with many other characteristics of the respondents and results of these analyses are available upon request. Many of these analyses confirm earlier results (e.g., as familiarity with the main basin increases, the preferences for walleye decreased and Chinook salmon increased).

## Comments

From the 1131 returned surveys, 220 people provided comments to a question on fish stocking. Another 353 people provided general comments at the end of the questionnaire. A total of 155 people stated their preferences for management (in many cases stocking), 104 comments expressed concerns over an aspect of fisheries management, 25 comments provided observations regarding fish populations, five comments stated that the



**Figure 25.** Convenience Sample preferences for status quo outcomes, fish stock collapse, and prey fish community characteristics.

individual was not qualified to complete the survey, three comments provided an evaluation of current management, and one comment mentioned another topic (Table 6).

Many respondents stated that they want walleye stocking. The next most common stocking request was for trout and bait fish species. Often, bait fish stocking comments were made in conjunction with expressions of concern over the inability of current prey fish populations to support stocking efforts. Many respondents also suggested that fish numbers have been decreasing.

Some respondents expressed concern about fishing by Aboriginal people. Of almost equal concern were commercial fishing and cormorants. Other concerns included invasive species and a perceived lack of enforcement.

At the end of the questionnaire, 209 comments expressed concerns over an aspect of fisheries management, 74 comments were related to preferences about aspects of management (in many cases stocking), 50 comments provided observations regarding fish populations, 43 comments were received about the survey design, 21 comments provided an evaluation of current management, and six comments mentioned other topics of interest (Table 7).

As with the previous set of comments, a preference was expressed for the stocking of walleye. Many respondents also expressed their dislike for lake trout and almost as many expressed similar sentiments toward Chinook salmon. Several respondents also commented on the dwindling numbers of fish in general.

Again, the greatest concerns expressed by respondents were fishing by Aboriginal people and



**Table 6.** Frequency and type of comments received from a question asking for comments about fish stocking on Lake Huron.

Category	Theme	# of comments
Preference	Stock walleye	24
	Stock trout	13
	Stock bait fish	13
	Salmon are undesirable	12
	Native fish stocks	11
	Stock perch	10
	Lake trout are undesirable	9
	Stock salmon	9
	Stock splake	8
	Support local stocking efforts	8
	Stock rivers	7
	Habitat improvement	7
	Funding for stocking	5
	Stock bass	4
	Stock pike	4
	Stock whitefish	3
	Increase possession limits	2
	Stop stocking	2
	Other	4
Concern	Aboriginal fishing	29
	Commercial fishing	21
	Cormorant	21
	Bait fish populations (decreasing)	13
	Invasive species	8
	Enforcement and compliance with regulations	7
	Water quality	3
Observation	Water quantity	2
	Fewer fish	21
Evaluation	Smaller fish	4
	Satisfied with management	3

commercial fisheries, and cormorant populations. A strong concern for a decline in bait fish populations was also re-iterated in this comment section.

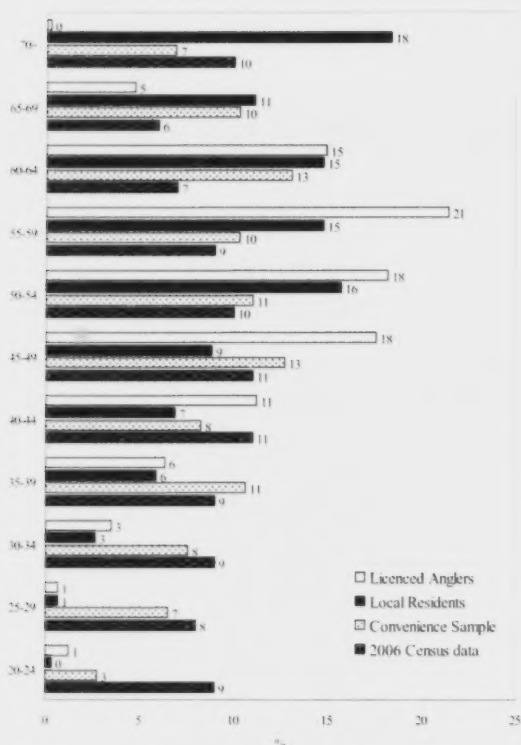
### Respondent Characteristics

A comparison was made between the demographics of respondents and those collected in 2006 by the Canadian census for the study area (Statistics Canada 2006). While the census data revealed an almost even split between men

**Table 7.** Frequency and type of general comments received from respondents.

Category	Theme	# of comments
Preference	Lake trout are undesirable	12
	Stock walleye	12
	Native fish stocks	11
	Salmon are undesirable	10
	Stock trout	10
	Improve habitat	8
	Stock bass	6
	Stock perch	6
	Stock salmon	4
	Increase possession limits	4
	Decrease possession limits	3
	Stock pike	2
	Stock splake	2
Concern	Aboriginal fishing	36
	Commercial fishing	35
	Cormorant	32
	Prey fish populations (decreasing)	31
	Invasive species	26
	Water quantity	25
	Water quality	18
Observation	Enforcement and compliance with regulations	16
	Fewer fish	38
	Smaller fish	10
	More fish	2
Evaluation	Satisfied with management	13
	Dissatisfied with management	8
Survey	Difficulty with stated preference choice model	27
	Not qualified to complete survey	17
Mention	Sturgeon	3
	Special treatment for tourism operators	3

and women in the study area, survey respondents were predominantly male (about 80% for the *Local Residents*, 90% for *Licensed Anglers*, and 95% for the *Convenience Sample*). This difference may arise because respondents were chosen from a purchased mailing list that often listed a male for the household. Also, surveys related to recreational fishing and hunting typically receive a much stronger response from males than females

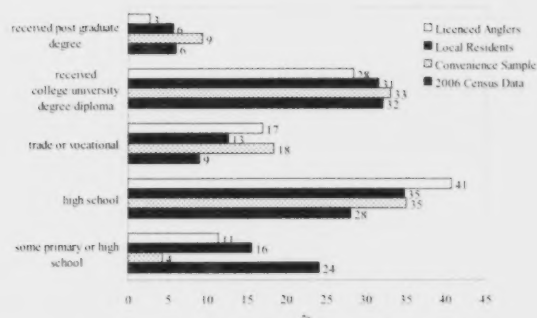


**Figure 26.** Comparison of census data and survey respondents by age categories. (Note: some survey respondents may have been less than 20 and are included in the 20-24 age category).

(Jacobsen, Brown, & Scheufele 2007) and about 80% of resident anglers in Ontario are male (Department of Fisheries and Oceans 2008).

Survey respondents are older on average than the population from the census data (Figure 26). In particular, there was a larger portion of *Licenced Anglers* in the 45-59 year age classes than in either of the other sample groups or the census data. Similarly, there was a much larger portion of the *Local Residents* in the 70+ age class when compared to the other groups and the census.

Our survey respondents also differed from the population by educational achievement (Figure 27). We received fewer responses from individuals with some primary or high school education than exists in the population. Conversely, when compared to the census population, a higher percentage of our sample groups had completed high school or trade or vocational certification. The group with the most formal education was the *Convenience Sample*.



**Figure 27.** Comparison of education levels between survey respondents and census data.

This result may have arisen from our survey delivery modes (mail and internet rather than phone) or from the complexity of the questionnaire.

The results show some major differences in sex, age, and education between the sample and the population especially for the *Local Residents* group. While these differences may create doubt in representation of the sample to the population, adjusting the results by these differences in demographics may not solve any bias (Looseveldt & Sonck 2007).

## DISCUSSION

This discussion outlines how the survey results helped us to meet the two primary research objectives. This section also addresses the secondary objectives by relating the results to these objectives.

### Primary Research Objectives

The two main objectives from the survey were to understand preferences for fish stocking on Lake Huron by Ontarians and to understand how similar or different these preferences were among respondents. The following paragraphs summarize how our results addressed these objectives.

*What level of acceptance exists among people for stocking different fish species in Lake Huron?*

The vast majority of respondents agreed with the stocking of fish in Lake Huron. With minor exceptions (to follow), over 80% of all respondents either agreed or strongly agreed with the stocking of lake trout, walleye, Chinook salmon, rainbow

trout and brown trout. Some differences in agreement for fish stocking existed among the responses from the three groups surveyed. These differences included a slightly lower level of agreement for stocking lake trout by respondents from the *Convenience Sample*. Similarly, agreement for stocking lake trout was slightly lower for respondents who were most familiar with the Main Basin. For Chinook salmon, agreement was less than 80% for both the *Licensed Anglers* and the *Local Residents*. When compared by basin, agreement with Chinook salmon stocking was greatest for respondents who were familiar with the Main Basin.

These differences in species preferences and stocking of Chinook salmon in the main basin are likely a result of differences in the fish community and fishery. Walleye are clearly preferred by the *Licensed Anglers* and *Local Residents* who are most familiar with Georgian Bay and the North Channel. This result likely reflects the ability of these basins to support more diverse and widespread, near shore populations of walleye. Although walleye are present in the southern portion of the main basin and are harvested commercially, they are often found in offshore waters and at depths that may be considered atypical for the species. Given the lack of typical walleye angling opportunities in the main basin, recreational anglers likely target other species more widely such as Chinook salmon. The lack of diverse, complex shorelines like those present in eastern Georgian Bay and the North Channel, and the protection they offer for small boats, likely foster this drive to target non-native species in tributaries and from boats; and the resultant preferences for stocking Chinook salmon and other non-native species.

*What mix of fish species do people prefer in stocking plans for Lake Huron?*

More respondents preferred a mix of native and introduced species than any other option for stocking fish into Lake Huron. Among the other options, the respondents from the *Convenience Sample* had the lowest preference for options of native and current species mixes and the highest preference for options containing Chinook salmon and other introduced species. Most individuals with high familiarity with the main basin of Lake Huron disliked the native species mix.

These results suggest that most respondents would prefer to see a stocking strategy with a more balanced distribution between native and non-native fish species, as opposed to the current emphasis on lake trout and other native species. However, stocking of walleye was very important to many individuals (*Licensed Anglers* and *Local Residents*) as evidenced by the high preference for walleye as a game species and the high preferences for stocking strategy outcomes that result in increased walleye abundance. On a Provincial scale, walleye is also a very desirable fish species (Hunt 2006). This preference for walleye in Georgian Bay and the North Channel likely results from local anglers having an opportunity to fish for walleye in inland lakes and in some basins of Lake Huron.

*What level of fish stocking do people prefer in stocking plans for Lake Huron?*

Not surprisingly, most respondents preferred to see an increase in the number of fish stocked. Respondents from the *Local Residents* group were much less likely to support stocking numbers above current levels than were members from the other groups. Very few respondents (less than 8%) preferred decreasing the current stocking levels.

In some ways, these results are concerning given the finite capacity of Lake Huron to produce game fish species. This capacity is now likely smaller following the recent lake wide alewife collapse (Beuce et al. 2008). Currently, any large increase in stocking may not result in any significant increases in the number of fish available to the recreational fishery. As Dobiesz et al. (2005, p. 1447) state, "the stocking lever may no longer function as in the past". In fact, increased stocking may pose the risk of collapsing the remaining prey fish community through increased predation. This collapse could result in negative consequences for existing game fish populations. The desire generally expressed by survey respondents for increased stocking while not fully informed is common (e.g., Pister 2001). Perhaps OMNR staff must work to continue educating the public about balancing expectations from the fish community and the potential negative and positive effects from stocking.

*What outcomes do people prefer from stocking on Lake Huron?*

The stated preference choice model suggested

some important trade-offs among attributes of fish species and size. For individuals from the *Convenience Sample*, the abundance of Chinook salmon and rainbow trout and the size of fish were all about equally important. For the *Local Residents* and *Licensed Anglers*, the abundance of walleye was by far most important. However, even for these groups, combinations of lake trout abundance, rainbow trout abundance, and fish size could compensate individuals for lower abundance of walleye.

The results from the choice model also support the importance of avoiding increased risks of fish stock collapse or unnatural changes to prey fish communities. All groups preferred outcomes with reduced risks of fish stock collapse, suggesting that the individuals would trade off some aspects of abundance and fish size for reductions to this risk. Natural prey fish communities were also important to individuals from the three groups when choosing among the competing outcomes. The preference for the natural prey fish community was especially noticeable for the *Convenience Sample*.

Again, these results suggest that more effective communication is needed about expectations from the Lake Huron ecosystem. Respondents generally suggested they preferred more stocking, with many indicating twice the current stocking rates. This preference likely conflicts with the desire to avoid increased risk of fish stock collapse as expressed from the choice model analysis. Increasing stocking is likely to increase the risk of collapsing the lakes prey fish community (native or otherwise) that is currently in a depressed state of abundance.

## Secondary Research Objectives

Three secondary research objectives were identified for the social survey. These objectives were pursued to profile individuals from the different groups and to provide further opportunities to understand differences in preferences between individuals and groups.

*How do people make use of Lake Huron for recreation and fishing pursuits?*

Most respondents pursued recreational fishing and other outdoor recreational activities on or around Lake Huron. The proportion of anglers in the *Local Residents* sample was significantly higher than proportion of residents who own fishing

licences (Browne & Hunt 2007). Consequently, the respondents from the *Local Residents* are not fully representative of the group. This result was expected as individuals who care little about fishing on Lake Huron would have little motivation to complete the survey.

For respondents who had fished in 2007 on Lake Huron, many preferred to target walleye. However, members of the *Convenience Sample* were more likely to prefer targeting Chinook salmon and rainbow trout than were other respondents. Chinook salmon were also the preferred species for respondents most familiar with the main basin of Lake Huron (see discussion above). Lake trout was a preferred target species for few individuals with about one in six of the *Local Residents*, one in 14 of *Licensed Anglers* and less than one in 33 of the *Convenience Sample* members preferring lake trout.

More respondents pursued fishing from shore or a boat near shore than in offshore locations. Members of the *Convenience Sample* were most likely to pursue offshore fishing. Members of the *Licensed Anglers* were most likely to have ice fished on Lake Huron.

*What perceptions exist about the changing environmental quality of Lake Huron?*

The respondents generally believed that fish health, water quality, invasive species, and fish habitat have worsened over the last 10 years. The especially high percentage of respondents suggesting that invasive species have become worse likely reflects noticeable changes to the lake and the success of media education efforts to make people aware of invasive species. With the exception of water quality, the respondents from the *Convenience Sample* were most likely to state that conditions had worsened. This result may have arisen from the fact that individuals contacted for the *Convenience Sample* actively worked with OMNR on Lake Huron and may have been most aware of issues confronting the lake.

Other concerns related to the fishing quality on Lake Huron were evident from the comments provided by the respondents. Some individuals perceived problems with fish harvesting by Aboriginal people, commercial fishers, and cormorants. Other individuals noted concerns with the decreasing population of prey fish.

*What are the characteristics of individuals from the three groups?*

The respondents to the survey were overwhelmingly male. Respondents also were older on average than the population of individuals residing near Lake Huron. Education attainment was higher than the census data with an over representation of high school graduates and an under representation of individuals with some primary or high school education.

## SUMMARY

The survey responses suggest that strong support existed for using stocking as a management tool for Lake Huron. Only a small minority of respondents disagreed with stocking of any of the five fish species in Lake Huron. Respondents preferred a more balanced mix of native and introduced fish species for stocking into Lake Huron. This represents a departure from the current emphasis of stocking lake trout. Most respondents were supportive of increasing or maintaining stocking rates. However, respondents were concerned about the sustainability of fish populations as evidenced from their preference to avoid increasing the risk of fish stock collapse or changes to the prey fish community.

*Licensed Anglers* most preferred stocking strategies that favoured walleye. *Local Residents* were more likely than were others to support stocking efforts focused on native fish species. Apparently, individuals who live near Lake Huron are supportive of efforts to rehabilitate or enhance native fish species. Respondents from the *Convenience Sample* preferred stocking strategies that favoured Chinook salmon. Given their familiarity, interest, and experiences of fishing on Lake Huron, it is likely that members of the *Convenience Sample* will be most vocal about any proposed changes to fish stocking on Lake Huron.

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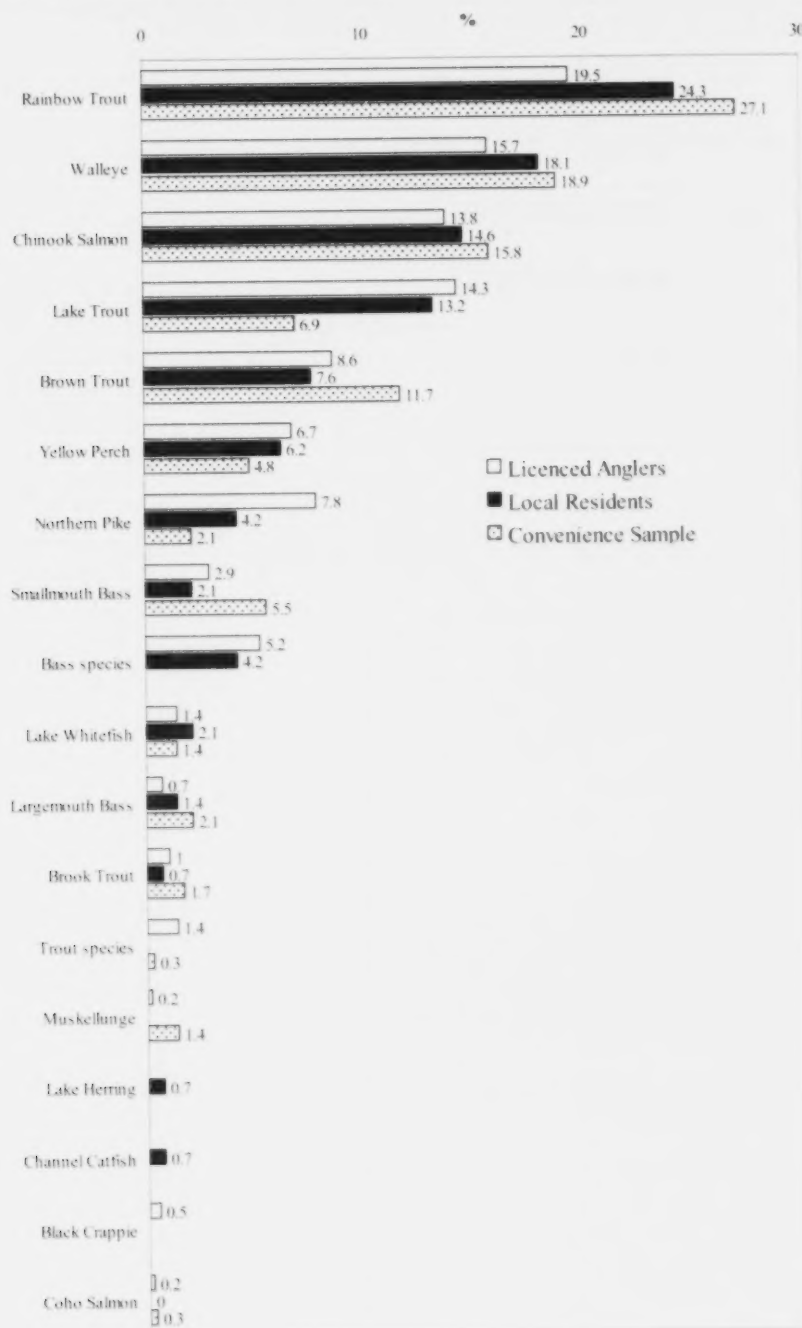


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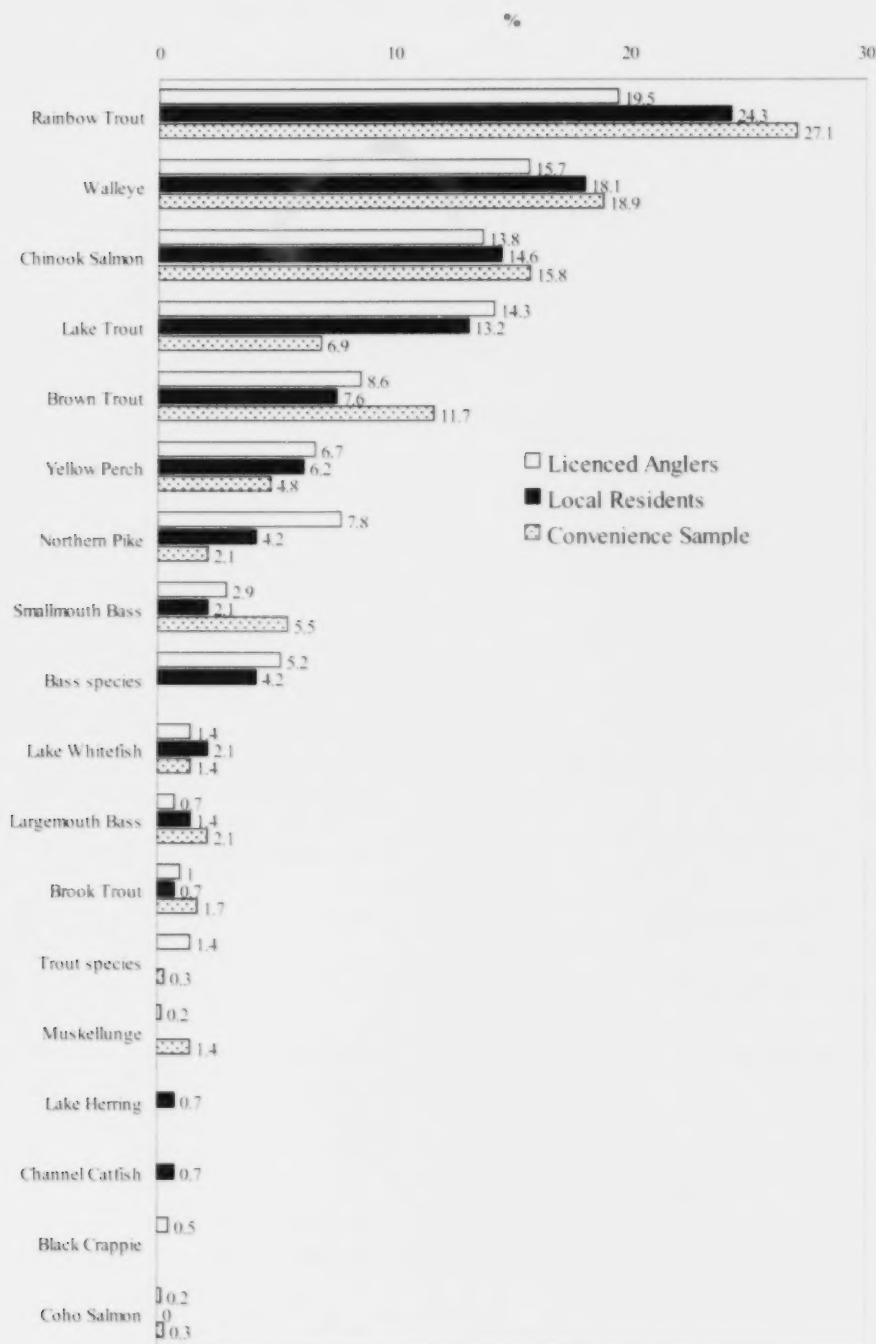
## APPENDIX A

### Preferred Fish Species by Sampling Group

Please list the three species you prefer catching in Lake Huron and its tributaries in order of importance – first choice (n=431, 152, 295; Chi square:  $p < 0.001$ ).

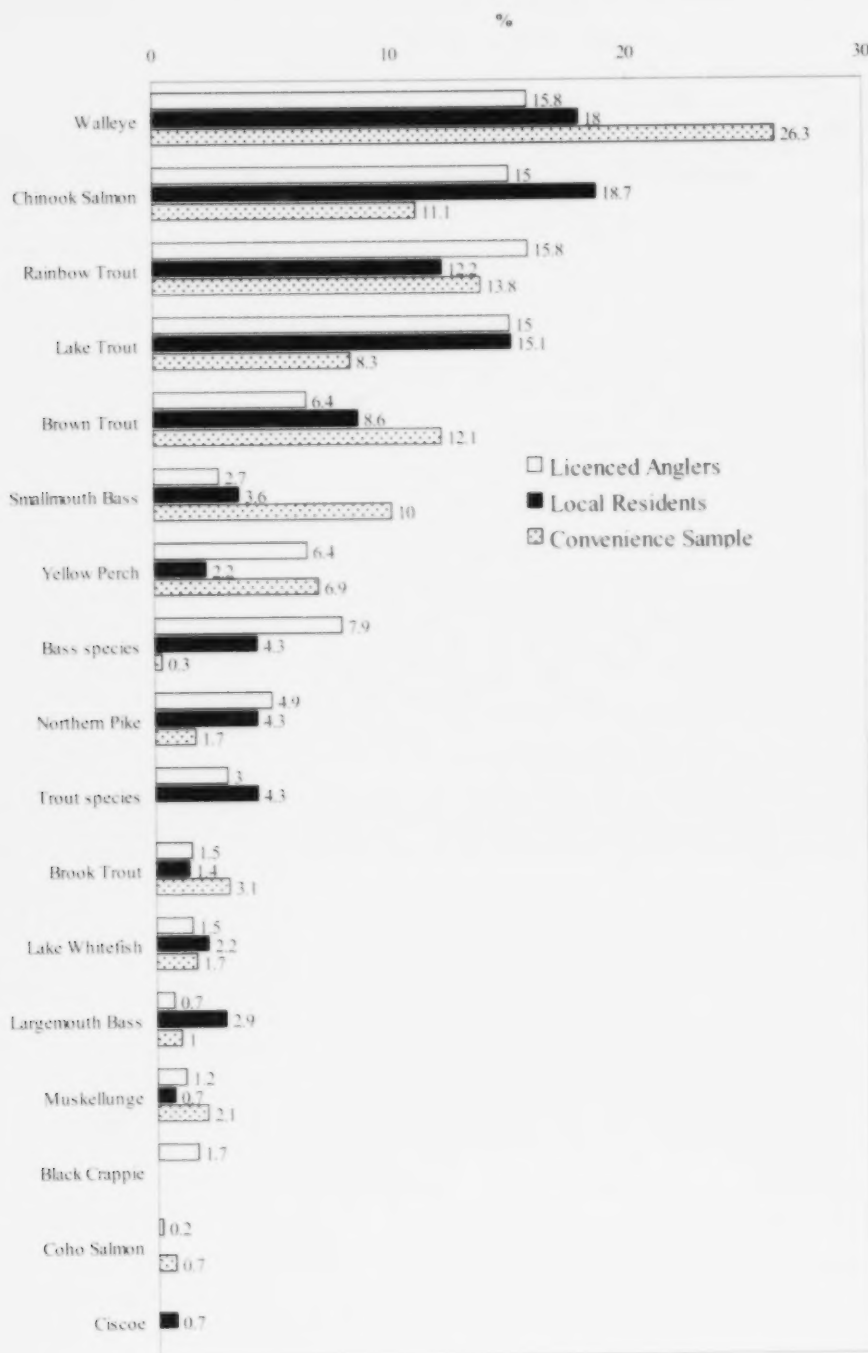


Please list the three species you prefer catching in Lake Huron and its tributaries in order of importance – second choice (n=421, 144, 291; Chi square: p=0.012).





Please list the three species you prefer catching in Lake Huron and its tributaries in order of importance – third choice (n=406, 139, 289; Chi square:  $p < 0.001$ ).



**APPENDIX B****Preferred Fish Species by Respondents' Familiarity  
with Basins of Lake Huron**

First choice of species by basin of familiarity (%).

1st choice	Main basin (n=256)	Georgian Bay (n=346)	North Channel (n=149)	Main basin rivers (n=203)	Georgian Bay rivers (n=238)	North Channel rivers (n=98)
walleye	25.1	30.1	38.3	18.7	26.9	35.7
Chinook salmon	33.3	21.1	20.8	30.5	21.4	22.4
rainbow trout	22	21.7	15.4	33.5	27.7	15.3
lake trout	3.5	8.1	8.7	3.4	6.3	9.2
yellow perch	4.3	2.6	4.7	3	2.1	2
smallmouth bass	5.5	2.6	0	3.4	2.9	1
brook trout	2	1.2	2	3	1.7	3.1
northern pike	0	2.6	2	0	2.5	2
brown trout	1.6	1.2	1.3	2	1.3	1
muskellunge	0.4	1.4	0	0.5	2.1	1
largemouth bass	0	0.6	1.3	0	0	2
lake whitefish	0.8	0.6	0.7	0.5	0.4	0
trout species	0	0.3	0.7	0	0.8	1
black crappie	0	0.6	0	0	0.8	0
splake	0	0.3	0.7	0	0	1

Second choice of species by basin of familiarity (%).

2nd choice	Main basin (n=252)	Georgian Bay (n=339)	North Channel (n=146)	Main basin rivers (n=200)	Georgian Bay rivers (n=233)	North Channel rivers (n=96)
rainbow trout	25.4	20.1	19.9	23.5	20.2	21.9
Walleye	20.2	14.5	15.1	18	13.7	15.6
Chinook salmon	13.1	15	16.4	17	15.9	12.5
lake trout	8.7	11.8	19.2	5	13.3	19.8
brown trout	12.3	10	6.8	16	11.6	6.3
yellow perch	8.3	4.4	6.2	7.5	1.7	6.3
northern pike	2.4	8.6	5.5	2.5	6.4	6.3
smallmouth bass	4.4	4.7	2.7	5.5	4.7	4.2
lake whitefish	1.6	2.1	1.4	2	2.6	2.1
bass species	0.8	4.4	0.7	0	4.3	0
largemouth bass	0.8	2.1	2.1	1	2.1	1
trout species	0.8	0.9	2.1	0	0.4	1
brook trout	1.2	0.6	0	1.5	0.9	1
coho salmon	0	0	1.4	0.5	0.4	2.1
black crappie	0	0.3	0	0	0.9	0
muskellunge	0	0.6	0	0	0.9	0
lake herring	0	0	0.7	0	0	0

Third choice of species by basin of familiarity (%).

3rd choice	Main basin (n=249)	Georgian Bay (n=334)	North Channel (n=140)	Main basin rivers (n=199)	Georgian Bay rivers (n=228)	North Channel rivers (n=93)
walleye	22.5	17.1	17.9	22.6	18.9	17.2
rainbow trout	16.1	12.3	12.9	16.1	14	14
Chinook salmon	13.7	13.8	10.7	13.1	13.6	11.8
lake trout	8.8	13.5	14.3	9.5	12.7	15.1
brown trout	10.8	9.3	9.3	12.6	11	8.6
yellow perch	9.2	4.8	7.1	6.5	4.4	7.5
smallmouth bass	5.2	7.8	5	6.5	5.7	5.4
northern pike	2	3.9	7.1	1	4.4	5.4
bass species	2	5.1	3.6	0.5	3.5	4.3
brook trout	2.8	2.4	2.1	4	2.6	2.2
lake whitefish	1.2	1.8	3.6	2	1.3	2.2
largemouth bass	1.6	1.8	2.9	1.5	1.8	2.2
trout species	1.6	2.1	1.4	1.5	1.3	2.2
muskellunge	1.6	1.5	1.4	1	2.2	1.1
black crappie	0	2.1	0	0	0.9	0
coho salmon	0.4	0.3	0	1	0.9	0
ciscoe	0	0.3	0	0	0	0

## APPENDIX C

### Results from the stated preference choice model

Parameter estimates and standard errors (parentheses) for attribute levels from conditional logit model that accounts for differences among the sampling groups<sup>1,2</sup>.

Parameter	Base	Interaction	
		(Local Residents)	(Convenience Sample)
Status Quo Outcome	-0.49** (-0.03)	0.01 (-0.05)	0.03 (-0.05)
<i>Risk of fish collapse</i>			
Slightly lower	0.23** (-0.03)	0.00 (-0.04)	-0.04 (-0.04)
Same as today	0.03 (-0.03)	-0.04 (-0.04)	0.02 (-0.04)
<i>Preyfish community</i>			
More natural	0.11** (-0.03)	0.02 (-0.04)	0.04 (-0.04)
Same as today	0.03 (-0.03)	0.08* (-0.04)	-0.10** (-0.04)
<i>Abundance of fish species</i>			
Lake trout (linear)	0.13** (-0.02)	0.07* (-0.03)	-0.15** (-0.03)
Lake trout (quadratic)	0.01 (-0.01)	-0.02 (-0.02)	0.02 (-0.02)
Walleye (linear)	0.45** (-0.02)	0.03 (-0.03)	-0.27** (-0.03)
Walleye (quadratic)	0.04** (-0.01)	0.00 (-0.02)	-0.02 (-0.02)
Brown trout (linear)	0.13** (-0.02)	-0.03 (-0.03)	0.04 (-0.03)
Brown trout (quadratic)	0.01 (-0.01)	0.01 (-0.02)	-0.03 (-0.02)
Chinook salmon (linear)	0.11** (-0.02)	-0.06 (-0.03)	0.12** (-0.03)
Chinook salmon (quadratic)	0.02 (-0.01)	0.02 (-0.02)	-0.02 (-0.02)
Rainbow trout (linear)	0.31** (-0.02)	-0.05 (-0.03)	0.04 (-0.03)
Rainbow trout (quadratic)	0.00 (-0.01)	0.01 (-0.02)	0.01 (-0.02)
Size of fish (linear)	0.23** (-0.02)	-0.06 (-0.03)	0.05 (-0.03)
Size of fish (quadratic)	0.05** (-0.01)	0.00 (-0.02)	-0.01 (-0.02)

\* (\*\*) probability that the estimate equals zero is less than 0.05 (0.01)

<sup>1</sup> For both the *Local Residents* and the *Convenience Sample*, the partworth utilities equal the parameter estimate from the base plus the parameter estimate from the interaction column. For *Licensed Anglers*, the partworth utilities equal the base minus the parameter estimates from both interactions. Partworth utilities for missing attribute levels for risk and prey fish community attributes, equal the negative sum of the two parameter estimates for the attribute. Partworth utilities for the fish abundance and the fish size attribute are as follows (50% more = linear - quadratic, Same as today = 2 \* quadratic, 50% less = - linear - quadratic).

<sup>2</sup> The log likelihood for the model without parameter estimates is -6899.2 and -6024.3 for the model with parameter estimates.

**APPENDIX D****LAKE HURON (Including Georgian Bay and the North Channel) FISH  
COMMUNITY QUESTIONNAIRE**

Ministry of  
Natural  
Resources

Conducted for:  
Upper Great Lakes Management Unit  
Ontario Ministry of Natural Resources  
c/o 955 Oliver Rd.  
Thunder Bay, ON P7B 5E1

## LAKE HURON FISH COMMUNITY QUESTIONNAIRE

*Please Note:* Throughout this survey, the term 'Lake Huron' will refer to all of Lake Huron including Georgian Bay and the North Channel.

### PART A:

1. How important is Lake Huron and its tributaries (rivers that flow directly into Lake Huron) to you personally? (Please check ☒ the box that applies)

Not at all important	Not important	Somewhat important	Important	Very important
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. How familiar are you with the following sections of the Lake Huron watershed? (Please see map on front cover for reference - and check ☒ one box for each line)

	Not at all familiar	Somewhat familiar	Very familiar
Main basin of Lake Huron	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Georgian Bay	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
North Channel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rivers flowing into Main Basin of Lake Huron	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rivers flowing into Georgian Bay	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rivers flowing into North Channel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Do you use Lake Huron or its tributaries for any of the following purposes? (Please check ☒ one box for each line)

Yes	No	
<input type="radio"/>	<input type="radio"/>	I live near the lake or its tributaries all year
<input type="radio"/>	<input type="radio"/>	I live near the lake or its tributaries for part of the year
<input type="radio"/>	<input type="radio"/>	I pursue recreational fishing
<input type="radio"/>	<input type="radio"/>	I pursue other recreational activities (e.g. boating, swimming, picnicking)
<input type="radio"/>	<input type="radio"/>	I earn a living from the lake or its tributaries (e.g. commercial fisherman, operate marina, operate tourism resort)
<input type="radio"/>	<input type="radio"/>	I fish for food for myself or my family
<input type="radio"/>	<input type="radio"/>	I enjoy seeing the lake and knowing it exists.

4. For how many years have you used Lake Huron or its tributaries?

\_\_\_\_\_ years

5. All of the following fish species are stocked (*raised in captivity and released into the wild, usually at less than two years of age*) in Lake Huron or its tributaries. Were you aware that each of these fish species are stocked in the Lake Huron watershed prior to reading this question? (Please check ☒ one box for each fish species)

Yes	No	Species	
<input type="radio"/>	<input type="radio"/>	Brown Trout	[Introduced / naturalized species]
<input type="radio"/>	<input type="radio"/>	Chinook Salmon	[Introduced / naturalized species]
<input type="radio"/>	<input type="radio"/>	Lake Trout	[Native species]
<input type="radio"/>	<input type="radio"/>	Walleye (Pickerel)	[Native species]
<input type="radio"/>	<input type="radio"/>	Rainbow Trout	[Introduced / naturalized species]



6. Do you agree or disagree with the stocking of each of the following fish species in Lake Huron and its tributaries? (Please check ☒ one box for each fish species)

Species	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not sure / No Opinion
Brown Trout	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chinook Salmon	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lake Trout	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Walleye (Pickerel)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rainbow Trout	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. The total number of fish stocked on the Ontario side of Lake Huron currently averages 3,400,000 fish annually. Please indicate how many fish you would like to see stocked in Lake Huron and its tributaries. (Please check ☒ the box that applies)

- ☐ No stocking → (Please skip to question 10)
- ☐ ½ the current level (1,700,000 fish)
- ☐ ¾ the current level (2,500,000 fish)
- ☐ Current level (3,400,000 fish)
- ☐ 1.5 times current level (5,000,000 fish)
- ☐ 2 times current level (6,800,000 fish)
- ☐ Other \_\_\_\_\_
- ☐ Not sure

8. In what proportions would you like to see fish species stocked in Lake Huron and its tributaries? (Please indicate below ☒ your one most preferred and your one least preferred option)

	Option 1	Option 2	Option 3	Option 4	Option 5
	Current species mix	Focus on native species	Focus on Chinook	Focus on introduced species	Mix of native and introduced species
Lake Trout	58%	90%	20%	20%	20%
Chinook Salmon	16%	0%	60%	40%	20%
Rainbow Trout	10%	0%	10%	20%	20%
Brown Trout	7%	0%	8%	18%	20%
Walleye (Pickerel)	9%	10%	2%	2%	20%
 Most Preferred	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 Least Preferred	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. What is more important to you, the fish stocking policy or the outcomes from stocking in Lake Huron and its tributaries? (Please check ☒ only one box)

- ☐ Stocking policy (the number and type of fish stocked)
- ☐ Outcomes (the number and size of fish, and ecosystem health)
- ☐ The stocking policy and the outcomes are equally important
- ☐ The stocking policy and the outcomes are equally unimportant
- ☐ Not sure

10. If you have any comments about fish stocking in Lake Huron and its tributaries that you would like to share with us please write them here.

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**11. Did you fish in Lake Huron or its tributaries in the past three (3) years?**☐ Yes☐ No → (Please skip to question 14)**12. Please list the three species you prefer catching in Lake Huron and its tributaries in order of importance.**

Fish species

1 (most preferred)

\_\_\_\_\_

2

\_\_\_\_\_

3

\_\_\_\_\_

**13. Over the past three (3) years, how have you fished Lake Huron or its tributaries? (Please check ☒ one box for each line)**

Yes    No

- ☐    ☐ I fished from shore in the lake or its tributaries (I do not use a boat)
- ☐    ☐ I fished from a boat in near-shore waters (within 10km of shore) or in tributaries
- ☐    ☐ I fished from a boat in offshore waters (more than 10km shore)
- ☐    ☐ I ice fished on the lake or its tributaries in the winter
- ☐    ☐ Other \_\_\_\_\_
- ☐    ☐ Other \_\_\_\_\_

**14. Compared to ten years ago, how do you think Lake Huron and its tributaries are doing in the following areas? (Please check ☒ one box for each line)**

	Getting worse	Staying the same	Getting better	Don't know
Fish health (e.g. disease)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Water quality (e.g. pollution)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Invasive species	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fish habitat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## PART B: PREFERENCES FOR A FUTURE LAKE HURON

On each of the following seven pages, we present you with three outcomes that describe fish size, fish numbers and ecosystem health for Lake Huron and its tributaries. For each page, please choose your most preferred outcome for Lake Huron and its tributaries. Please remember that throughout this survey the term 'Lake Huron' refers to all of Lake Huron including Georgian Bay and the North Channel.




Your responses will help us to understand the outcomes that people like yourself desire for Lake Huron. We will use this information along with your other survey responses, other consultation efforts and scientific information to develop a new fish stocking plan for Lake Huron.

### Glossary

Risk of fish stock collapse: The likelihood of a large reduction in numbers of fish in Lake Huron












Prey fish community: Fish species that other fish (e.g. walleye, lake trout, salmon) feed on. Introduced prey species such as rainbow smelt and alewives have been dominant members of the prey fish community of Lake Huron since the 1950s and 1960s. Native prey species for Lake Huron include stickleback, sculpins, bloater, lake herring, lake whitefish, cyprinids, yellow perch and trout-perch. Currently the prey fish community in Lake Huron is made up of a mix of native and introduced species.


Number of fish: The change in the number of fish of a given species

 50% less fish       Same amount of fish as today       50% more fish

Average size of fish: The average change in size for all fish species

- 15a.** If these were the **only** three possible outcomes from managing Lake Huron, which would you prefer? Please indicate below by checking ☒ your most preferred outcome (A, B, or C) for a future Lake Huron.

1-1	Outcome A	Outcome B	Outcome C
<b>Ecosystem</b>			
Risk of fish stock collapse	slightly decreased risk	slightly increased risk	same as today
Prey fish community (smaller fish that are food for species below)	same as today	mostly introduced prey	
<b>Fish</b>			
<b>Number of fish</b>			
Lake Trout	50% more 	50% less 	
Walleye (Pickerel)	same as today 	50% less 	
Brown trout	same as today 	50% less 	
Chinook Salmon	50% more 	50% less 	
Rainbow trout	same as today 	50% less 	
<b>Average size of fish</b>	50% larger	same as today	same as today

 **Preferred outcome**  
(choose one)

O

O

O

How certain are you about your answer to the above question? (Please check ☒ the appropriate box)

Not at all certain

O





















Somewhat certain


O

Very certain

O

- 15b.** If these were the **only** three possible outcomes from managing Lake Huron, which would you prefer? Please indicate below by checking ☒ your most preferred outcome (A, B, or C) for a future Lake Huron.

1-2	Outcome A	Outcome B	Outcome C
<b>Ecosystem</b>			
Risk of fish stock collapse	slightly decreased risk	slightly decreased risk	same as today
Prey fish community (smaller fish that are food for species below)	mostly native prey	same as today	
<b>Fish</b>			
<b>Number of fish</b>			
Lake Trout	50% less 	same as today  	same as today 
Walleye (Pickerel)	50% less 	50% more   	
Brown trout	same as today  	50% less 	
Chinook Salmon	50% more   	50% less 	
Rainbow trout	50% more   	same as today  	
<b>Average size of fish</b>	50% larger	same as today	

 **Preferred outcome**  
(choose one)

O

O

O

How certain are you about your answer to the above question? (Please check ☒ the appropriate box)

Not at all certain  
O

Somewhat certain  
O

Very certain  
O

- 15c. If these were the **only** three possible outcomes from managing Lake Huron, which would you prefer? Please indicate below by checking ☒ your most preferred outcome (A, B, or C) for a future Lake Huron.

1-3	Outcome A	Outcome B	Outcome C	
<b>Ecosystem</b>				
Risk of fish stock collapse	slightly decreased risk	same as today	same as today	
Prey fish community (smaller fish that are food for species below)	same as today	mostly introduced prey		
<b>Fish</b>				
<b>Number of fish</b>				
Lake Trout	50% more 	50% less 		same as today
Walleye (Pickerel)	50% more 	same as today 		
Brown trout	50% more 	same as today 		
Chinook Salmon	same as today 	50% more 		
Rainbow trout	50% more 	same as today 		
<b>Average size of fish</b>	same as today	50% smaller	same as today	

Preferred outcome  
(choose one)

0

0

0

How certain are you about your answer to the above question? (Please check ☒ the appropriate box)

Not at all certain

0












Somewhat certain


0

Very certain

0

- 15d.** If these were the **only** three possible outcomes from managing Lake Huron, which would you prefer? Please indicate below by checking ☒ your most preferred outcome (A, B, or C) for a future Lake Huron.

1-4	Outcome A	Outcome B	Outcome C
<b>Ecosystem</b>			
Risk of fish stock collapse	slightly increased risk	slightly increased risk	same as today
Prey fish community (smaller fish that are food for species below)	same as today	mostly introduced prey	
<b>Fish</b>			
<b>Number of fish</b>			
Lake Trout	same as today 	50% more 	
Walleye (Pickerel)	50% less 	50% more 	
Brown trout	50% less 	50% more 	
Chinook Salmon	same as today 	50% more 	
Rainbow trout	same as today 	50% less 	
<b>Average size of fish</b>	50% larger	same as today	same as today

 **Preferred outcome**  
(choose one)

O

O

O

**How certain are you about your answer to the above question?** (Please check ☒ the appropriate box)

Not at all certain

O

Somewhat certain

O

Very certain

O



- 15e. If these were the **only** three possible outcomes from managing Lake Huron, which would you prefer? Please indicate below by checking ☒ your most preferred outcome (A, B, or C) for a future Lake Huron.

1-5	Outcome A	Outcome B	Outcome C	
<b>Ecosystem</b>				
Risk of fish stock collapse	slightly increased risk	same as today	same as today	
Prey fish community (smaller fish that are food for species below)	same as today	mostly introduced prey		
<b>Fish</b>				
<b>Number of fish</b>				
Lake Trout	same as today 	50% more 		same as today
Walleye (Pickerel)	same as today 	50% less 		
Brown trout	same as today 	50% less 		
Chinook Salmon	50% less 	same as today 		
Rainbow trout	50% more 	same as today 		
<b>Average size of fish</b>	same as today	50% smaller	same as today	

Preferred outcome (choose one)

0

0

0

How certain are you about your answer to the above question? (Please check ☒ the appropriate box)

Not at all certain

0




















Somewhat certain

0

Very certain

0

- 15f. If these were the **only** three possible outcomes from managing Lake Huron, which would you prefer? Please indicate below by checking ☒ your most preferred outcome (A, B, or C) for a future Lake Huron.

1-6	Outcome A	Outcome B	Outcome C
<b>Ecosystem</b>			
Risk of fish stock collapse	same as today	slightly increased risk	same as today
Prey fish community (smaller fish that are food for species below)	same as today	mostly introduced prey	
<b>Fish</b>			
<b>Number of fish</b>			
Lake Trout	50% less 	same as today  	same as today ↓
Walleye (Pickerel)	50% more   	same as today  	
Brown trout	50% more   	same as today  	
Chinook Salmon	50% less 	same as today  	
Rainbow trout	same as today  	50% less 	
<b>Average size of fish</b>	50% larger	same as today	

☒ Preferred outcome  
(choose one)

0

0

0

How certain are you about your answer to the above question? (Please check ☒ the appropriate box)

Not at all certain

Somewhat certain




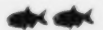







Very certain


0

0

0

- 15g. If these were the **only** three possible outcomes from managing Lake Huron, which would you prefer? Please indicate below by checking ☒ your most preferred outcome (A, B, or C) for a future Lake Huron.

1-7	Outcome A	Outcome B	Outcome C
<b>Ecosystem</b>			
Risk of fish stock collapse	slightly increased risk	same as today	same as today
Prey fish community (smaller fish that are food for species below)	mostly native prey	same as today	
<b>Fish</b>			
<b>Number of fish</b>			
Lake Trout	50% more 	50% less 	same as today 
Walleye (Pickerel)	same as today 	50% less 	
Brown trout	50% more 	same as today 	
Chinook Salmon	50% more 	50% less 	
Rainbow trout	same as today 	50% less 	
<b>Average size of fish</b>	50% smaller	50% larger	

 Preferred outcome  
(choose one)

☐

☐

☐

How certain are you about your answer to the above question? (Please check ☒ the appropriate box)

Not at all certain

☐

Somewhat certain

☐

Very certain

☐

**16. When choosing among the outcomes in questions 15a – 15g, how important was each of the following to you? (Please check ☒ one box for each line)**

<i>Information</i>	Not at all important	Somewhat Important	Very important
Risk of fish stock collapse	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prey fish community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Number of fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Average size of fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**PART C: ABOUT YOU**

To help group your responses with those from other individuals and to ensure that we have an adequate sample, we would like to know a little about yourself. Please be assured that all information will remain confidential.

**17. Please indicate the degree to which you agree or disagree with each of the statements below. (Please check ☒ one box for each statement)**

<i>Statement</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No opinion
Humans have the right to modify the natural environment to suit their needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When humans interfere with nature it often produces disastrous consequences	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humans are severely abusing the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humans were meant to rule over the rest of nature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humans will eventually learn enough about how nature works to be able to control it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**18. Are you? (Please check ☒ one box)**

☐ female ☐ male

**19. What is your age? (Please check ☒ one box)**

- |  |                                   |   |
|--|-----------------------------------|---|
| <input type="radio"/> 24 years or less | <input type="radio"/> 40-44 years | <input type="radio"/> 60-64 years       |
| <input type="radio"/> 25-29 years      | <input type="radio"/> 45-49 years | <input type="radio"/> 65-69 years       |
| <input type="radio"/> 30-34 years      | <input type="radio"/> 50-54 years | <input type="radio"/> 70 years or older |
| <input type="radio"/> 35-39 years      | <input type="radio"/> 55-59 years |   |

**20. What is the highest level of education you have achieved?** *(Please check ☒ one box)*

- |   |   |
|---|---|
| <input type="radio"/> some primary or high school | <input type="radio"/> received college/university degree or diploma |
| <input type="radio"/> completed high school       | <input type="radio"/> received post graduate degree (e.g., M.B.A.)  |
| <input type="radio"/> some college or university  | <input type="radio"/> trade or vocational qualification             |

**21. Please indicate if you identify yourself as any of the following:** *(Please check ☒ one box for each line)*

- | Yes                   | No                    |  |
|-----------------------|-----------------------|--|
| <input type="radio"/> | <input type="radio"/> | commercial fisherperson                |
| <input type="radio"/> | <input type="radio"/> | member of a fishing club / association |
| <input type="radio"/> | <input type="radio"/> | tourism operator                       |

**22. What are the first three characters of the postal code of your residence closest to Lake Huron?**

\_\_\_\_ \_

**23. Please record any comments you may have on the back of this booklet.**

*Thank you for taking the time to complete this questionnaire. Please return it to the Ontario Ministry of Natural Resources using the envelope provided.*







